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Opportunities for mutual implementation of nature conservation and climate change policies: A multilevel case study based on local stakeholder perceptions

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ABSTRACT

This paper assesses EU nature conservation and EU climate protection policies within the context of their local implementation in Vienna/Austria in order to gain insights into the decision-making process as well as to show the extent of achievements and experienced difficulties. In this connection, this paper also investigates based on published knowledge and the perceptions of stakeholders the awareness of nature conservation measures as climate-change adaptation and possibly ways of improvement. In order to address these issues, additionally to an in-depth literature review, 16 experts working in Vienna in the field of either nature conservation or climate protection were interviewed. The transcriptions of these interviews were then used in a qualitative content analysis. The findings show that the vast majority of the interviewed stakeholders see EU climate policy and nature conservation policy separately. Furthermore, the implementation of EU climate and nature conservation policy in Vienna is indicated as a "learning by doing" process. There the currently limited cooperation between stakeholders can be improved. Our study also finds that the awareness of different stakeholder groups of the possibility to use nature conservation as a measure against climate change is limited.

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1. Introduction

Increasing pressure on global environmental factors such as biodiversity and climate (Rockström et al., 2009; Steffen et al., 2015) also effect geographic levels below and related responses. Policies of the European Union (EU) concerning climate protection (the "Emission Trading Directive" and also the verification, monitoring and reporting of Greenhouse Gas Emissions) and conservation of biodiversity (the "Habitat Directive" and "Bird Directive") have been recently under examination. This happened through the so-called Refit process, a process that assessed the efficiency and effectiveness of EU-legislation (EC, 2017 related to climate actions; Fries-Tersch et al., 2015; Orlikowska et al., 2016 related to the Habitat and Birds Directives), also because pressure on both of them is rising as a result of climate change (Prisecaru, 2015). An increasing number of studies on climate change and sites of Natura 2000, the EU's protected areas network, focuses on conservation and use, cost effectiveness and willingness to pay, local attitudes and/or national enforcement and climate-change impact on Natura 2000 legislation (Blicharska et al., 2016). Climate-change adaptation must be seen as an interdisciplinary matter (Essl et al., 2013) since the measures demand changes across many sectors. Nature conservation policy is not only highly affected by climate change but also plays an important part in achieving climate-change reduction targets (EC, 2013a; Hagerman et al., 2009). Regarding EU nature conservation policy in terms of the Habitat Directive, the interpretation of this Directive by the European Court of Justice is crucial such as expressed in a case where the United Kingdom argued against the duty of member states to take measures against climate-change. The Court finally emphasised therein the opposite, namely that,

> "… it may be necessary to adopt both measures intended to avoid external man-caused impairment and disturbance and measures to prevent natural developments that may cause the

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conservation status of species and habitats … to deteriorate" (European Court of Justice (2005) para. 34).

To better understand the specific goals of nature conservation and climate policies, the broad overlap between the two areas has to be acknowledged, while also highlighting the apparent inconsistences or conflicts that can exist between the two policies (see Mauerhofer and Essl, 2016). The potential conflict between biodiversity conservation and climate change adaptation within land-use management (Shoyama et al., 2013), and the willingness to support nature conservation measures financially, is linked to the level of awareness according to which climate-change adaptation and ecosystem services security are prioritized (Shoyama et al., 2013). Measures are being considered to adapt Natura 2000 sites to climate change (EC, 2013a). These include reducing pressures on sites, ensuring ecosystem heterogeneity and appropriate abiotic conditions, dealing with extreme events and increasing connectivity (EC, 2013a), controlling invasive alien species, as well as supporting scientific research, policy and communication (Rannow et al., 2014). Such as indicated above with the EU-case-law example about the United Kingdom, the implementation of the EU-policies related to nature conservation and climate is crucial at the national level and below.

There has been research implemented also in Austria on climate change and Natura 2000 (see e.g. De Koning et al., 2014b) as well as on single Natura 2000 sites (see e.g. Lamaszewska, 2013). But stakeholder-focused research regarding climate adaptation within the purview Natura 2000 for the city of Vienna has not been undertaken as far as visible.

The aim of our analysis is to build on previous research and stakeholder's experience and show the opinions of local stakeholders involved in the implementation of EU policies on nature conservation and climate-change adaptation. Thus, this paper explores the stakeholder's perceptions and implementation of these EU policies as well as their implementation on a local level to determine if efficient and effective means are set to achieve policies' aims as well as the extent of achievements.

In the following chapters, after background and methodology, the results on implementation of the EU climate protection and EU nature conservation policy in Vienna are presented with a focus on adaptation, but also slightly discussing climate change mitigation (UNEP, 2016). Thus, the results' subchapters first concentrate on the fulfilment of the obligations arising from the EU climate and nature conservation policies and the extent of achievements respectively. Afterwards the management of Natura 2000 areas as part of the climate change adaptation of Vienna is assessed and the difficulties that limit the achievements by focussing on awareness and the reciprocal effect of climate and Natura 2000 sites are presented. Finally, the potential future role of nature conservation measures within climate adaptation is analysed. At the end, the paper provides summarized conclusions regarding the main findings.

2. Background

The city of Vienna has a population of about 1.8 million people and is the capital of Austria, a landlocked and widely mountainous country with a total population of 8 million, a size of roughly 83,000 km^2 and a membership with the European Union since 1995. Within this member state of the Union, the Vienna as local as well as one of the nine provincial authorities has – besides the federal level - competences for implementing the relevant EU-law in the area of legislation and implementation, especially for nature conservation but also partly for Climate Change (for details see Essl, 2016; Mauerhofer and Essl, in press; Mauerhofer, 2010; Mauerhofer, 2008). Vienna is not only in the beneficial but challenging situation of having a National park within its border (Punz and Navara, 2011) but also four Natura 2000 sites based on EU-legislation. These are the Special Protection Areas Liesing, (AT1303000), Lainzer Tiergarten, AT1302000, Lobau (AT1301000) and Bisamberg (AT1304000) which contain 22 protected habitat types of which ten even have priority status under the EU-law (for more details see e.g. Essl, 2016). The Natura 2000 areas of Vienna were chosen as they are an ideal testing ground, due to their close proximity to an expanding city with good regulatory compliance with EU law related to Climate Change and nature conservation.

3. Methodology

3.1. In-depth literature review

Literature was gathered through search in the databases Web of Science and Scopus by using the search terms "conservation", "nature conservation", "climate change", "city", "town", "local", "adaptation" and "mitigation" in varying combinations. The same method was implemented for the search of grey literature in the search engine google (www.google.com). The literature review was used to design interview guidelines, which include questions asked to interviewees of different stakeholder groups.

3.2. Expert interviews

Sixteen semi-structured interviews were carried out between 18th of Nov and 17th of Dec 2015 with selected interview partners from 5 stakeholder groups.

Three interviews per stakeholder group were implemented. The groups were:

1) The public administration of the Vienna responsible either for climate or nature conservation;
2) The administrations of the national park and Natura 2000 areas;
3) The management responsible for maintenance of the Natura 2000 areas in Vienna;
4) NGOs, or stakeholders who function in a similar way to an NGO, in the field of nature or climate conservation or adaptation, and
5) Scientists and researchers in the fields of conservation biology and climate change effects, including an additional representative or moderator/mediator (Table 1).

All the interviewees were selected because of their field of work and position and contacted via email before the face-to-face interviews. All interviews were recorded and 15 out of 16 interviews were conducted with one interviewee. Only the interview with NGO7 took place as a group discussion.

8 of the 10 semi-structural interviews questions (for details Appendix 2 in Essl, 2016) were specifically adapted to the particular stakeholder groups being interviewed. The questions for all groups were usually open questions (which cannot simply be answered with "yes" or "no") and formulated in a manner that do not guide the respondent into a certain direction. All interviewees were asked about the actors involved within the implementation process and which measures for the two policies will be important to put in place by 2020. Additionally, around three questions were respectively addressing issues of goals of climate policy, different interests and related conflicts. Furthermore, stakeholders were asked about their role and their interactions with other stakeholders. Other questions concerned the status quo and the way forward, especially pitfalls and potentials as well as concrete measures of improvements in the respective field of work of the stakeholder group.

Transcription was carried out with the aid of dictation software

Table 1
Code, stakeholder groups and their expertise and knowledge.

Code #	Stakeholder group by function	Organization	Area of expertise and knowledge
NGO1	NGO	Federal Environment Agency	Natura 2000
W2	Scientists	University of Vienna	Nature conservation, climate change
SM3	Nature reserve management	Private consulting	Natura 2000 Bisamberg
SV4	Nature reserve administration	Municipal Department for Environmental Protection (MA22)	Nature conservation law
SV5	Nature reserve administration	Municipal Department for Water Management (MA45)	Natura 2000 Liesing, Donauauen
W6	Scientists	University of Vienna	Nature conservation, climate change
NGO7	NGO	Viennese Environmental Ombudsman office for Environmental Protection	Environmental law
SM8	Nature reserve management	Viennese woods biosphere reserve	Nature conservation, Lainzer Tiergarten
ÖV9	Public administration	Viennese Climate coordination	Climate protection and climate change adaptation
SV10	Nature reserve administration	Municipal Department for Forestry and Urban Agriculture (MA49)	Natura 2000 Donauauen
ÖV11	Public administration	Municipal Department for Environmental Protection	Urban ecology, Natura 2000
W12	Scientists	University of Vienna	Nature conservation, climate change
M13	Mediator	University of Vienna	Nature conservation, conflict management
ÖV14	Public administration	Municipal Department for Forestry and Urban Agriculture	Natura 2000 (all 4 Viennese areas)
SM15	Nature reserve management	Municipal Department for Forestry and Urban Agriculture	Natura 2000 Donauauen, Bisamberg
NGO16	NGO	Federal Environment Agency	Climate protection and Climate change adaptation

(Express Scribe Transcription; NCH Software, 2015). Colloquial language, however, has been omitted, while interruptions are mentioned and incomprehensible passages marked within the transcripts. The passages used in this study sometimes contain ellipsis […] which show which parts of the original statement are missing, in order to provide short und precise answers. Sometimes words have been added to make the statement read grammatically or to provide clarity. To assure the anonymity of the interviewees, names and specific positions are neither mentioned in the transcriptions nor in this paper.

The first author conducted all the interviews. While the duration of each interview varied between 38 and 80 min, the mean duration was 52 min and each of the interviewee. The interviews, transcription and the qualitative analysis were carried out in German. All quotes and answers have been translated into English by the first author.

The review of the literature (3.1.) and the 16 semi-structured interviews (3.2.) generated the primary material for the qualitative content analysis. Interviews were used to gain facts as well as perceptions.

3.3. Qualitative content analysis

This paper uses an approach, the so-called qualitative content analysis, recently adopted in the field of conservation biology (Cousins et al., 2008), an approach combining a literature review and semi-structured interviews.

That qualitative content analysis was conducted as follows. During the literature research a deductive category system, based on concepts and factors (Bogner et al., 2014; Gläser and Laudel, 2004), was designed before the interviews took place (Mayring, 2010). The reason for choosing qualitative content analysis with content structuring was to better organize and structure the data as well as pare down the primary data to its essence. This retained the structure of the investigation as well as aiding the analysis of the data and increasing the level of transparency. The procedure was “open” so that a category could be added or be merged with another during the process of analysis (Gläser and Laudel, 2004).

The analysis was derived from the content structuring (Mayring, 2010), which consisted of:

1. The determination of the unit of analysis a theory-based determination of the main categories,
2. The preparation of a category system and assignment of interview statements via the atlas.ti software (Scientific Software Development GmbH, 2015), and,
3. The definition and simplification of categories in order to organize interview statements by categories and stakeholder groups (Mayring, 2010). The answers given by stakeholder groups were during the above-described content analysis classified into categories derived from the interviewee guidelines.
4. These categories were then reassigned in order to answer the research questions within a theoretical framework (Gläser and Laudel, 2004).

The results are presented as quotes from the interviews in order to show the wide range of answers and viewpoints (similar to Stål et al., 2015). Statements were assigned to categories (see Appendix) which constitute the most significant substantives from the questions of the interviewee guidelines. Furthermore, the quotes and results were analysed based on the in-depth literature review in order to broaden the approach. For better traceability the quotes are marked by an abbreviation for each interviewee (see Table 1 above). The code consists of an abbreviation for the stakeholder group and a number which denotes in no particular order.

4. Results and discussion

This chapter divides into five larger parts. While the first two parts concentrate on the way how Vienna fulfils the obligations of the EU climate protection policies and the EU nature conservation policies, the next part presents and discusses the extent of achievements of these two policies within Vienna. The last parts show and analyse the difficulties found that limit these achievements as well as the results about the potential future role of nature conservation measures within climate adaptation.

4.1. Fulfilling the obligations of EU climate policies

The EU climate policies consist of the 20-20-20 Targets, the Europe 2020 Strategy concerned with energy sustainability and climate change as well as ad-hoc rulings from the Directorate-General for Climate Action for the development and implementation of climate policies (EC, 2015a) such as the Climate and Energy Package, the EU Trading System and the Effort Sharing Decision as well as and ad-hoc proposals such as the Carbon Capture and Storage Directive and the Renewable Energy Directive (EC, 2015a). These policies have to be implemented by each EU member state.

The EU adaptation strategy focuses on promoting national adaptation strategies, climate-proofing actions within agriculture, fisheries and cohesion policies, and increasing informed decision-making through the European climate-adaptation platform (Climate-ADAPT) (EC, 2015a). The interviews and literature review show the concrete steps taken by Vienna to put these regulations into practice in order to meet the requirements of EU climate protection policy. These include the KLIP [The Viennese Climate Protection Programme I] which was decided on in 1999 and began in 2000 for a 10-year period and continues today with KLIP II which will run until 2020 (City of Vienna, 2017). The EU 2020 goals are not included within the KLIP I/II:

(1) "[as] the KLIP I existed before there were any 2020 goals of the EU. Therefore, we are pioneers […]. "(ÖV9)

The KLIP was developed with the aim of reducing 50% of per capita CO_2 emissions (with a reference point of 1987– till 2010) with a variety of measures like an energy efficiency program, the renovation of apartments, ecologically compatible construction sites and environmental management (Punz and Navara, 2011). In addition the Viennese Climate Protection Programme is:

(2) "A report … presented online annually and every few years a printed booklet is added including further information on Austrian climate-protection law and EU [regulations]. "(ÖV9)

This annual report is produced by the Austria Energy Agency (AEA) and also contains data from Austria's Informative Inventory Report (ÖV9):

(3) "The Federal Environmental Agency, also in co-ordination with us [AEA], publishes a report on NOx, greenhouse gases and so-called NEC gases every year. This [publication] is [based on] another EU regulation [through which] the Air Pollution Inventory for Austria is calculated, including the six greenhouse gases under the Kyoto Protocol." (ÖV9)

Emission trends between 1990 and 2013 decreased according to the Multi-Effect Protocol by −76.8% (SO_2), −24.7% (NOx), −55% (NMVOC), −0.3% (NH_3) and −54.8% (CO) (Federal Environment Agency, 2015), but CO_2 emission increased through higher energy consumption (Federal Environment Agency, 2015). Part of the EU's climate-protection policy is the EU bioenergy policy and latter supports the climate-protection policy through the setting of renewable-energy targets, by decreasing CO_2 emissions and providing alternatives to fossil fuels must be focused (Söderberg and Eckerberg, 2013). Current actions that have been put into practice include the one expressed in the following statement:

(4) "During housing renovation and new constructions, certain materials were banned and eco-electricity plants in Vienna, like photovoltaic, wind and water power plants [were set up]." (ÖV9)

Others are also ongoing. As part of its 2030 climate- and energy-policy goals, Vienna intends to invest further in the renovation of apartment buildings in order to improve their energy efficiency (Federal Environment Agency, 2014). Climate-protection goals were communicated to Viennese citizens, focusing on:

(5) "Viennese bicycle paths and also infrastructure policy as well as climate-friendly heating and waste management." (SM3)

In order to put in place, the climate change adaptation measures mentioned above, research is recommended into potential regional climate trends, climate-change-adapted building materials, cost-benefit calculations and the adaptation of infrastructure (BMLFUW, 2012b). In order to build awareness of climate-related issues, the city of Vienna put in place according to one of the interviewees the following measures:

(6) "Environmental awareness events in schools, guided tours in nature reserves and information events." (SV4)

Knowledge cannot only be imparted through building awareness measures but also stakeholders and citizens motivated and empowered by them to take action (BMLFUW, 2012a). One of the projects – that of promoting awareness – is an annual afforestation drive:

(7) "Despite the fact that space for afforestation is limited, each year afforestation takes place through the project "Young Viennese Woods" […] and recently afforestation by an airline was organised for climate-protection reasons." (SM15)

Apart from afforestation, it is recommended that there is more encouragement of roof and facade greening, the greening of unused areas and the unsealing of areas, as well as integrating scientific experts within the processes (BMLFUW, 2012b). Therefore, it can be said, that Vienna is trying with different approaches to fulfil the obligations of the EU climate protection policies. But this is still the beginning as the focus of the local politicians needs to increase in order to get a holistic, more effective approach.

4.2. Fulfilling the obligations of EU nature conservation policies

In order to fulfil the obligations of the Habitat Directive, an appropriate assessment procedure must take place within or near to Natura 200 sites to ensure according to Habitat Directive, Article 1-i, the favourable conservation status of habitats and species (EC, 2011a).

Another duty which derives from article 11 of Habitat Directive is monitoring and according to the perception of one stakeholder that:

(8) "Monitoring takes place within the range of distribution of a habitat or species to ensure that the measures are working according to nature-conservation regulations." (NGO1)

But apart from monitoring obligations, generally the key tools to provide connectivity of conservation areas are: 1) protected areas and protected-area law, 2) land-use-planning and development-control law, and, 3) that the flexible management of adaptation of must be provided for by law (Lausche, 2014).

The impacts of land use on biodiversity are habitat loss through the removal of soil and vegetation as well as species disturbance (EC, 2011b), as well as the possible promotion of invasive species (EC, 2011b). Another obligation is to provide compensatory measures in the case of overriding public interest, and they must be located within the biogeographical region, addressing the species, habitat type or ecosystem services which would be negatively affected (EC, 2011b). The protection against the possible disturbance of species through projects and the invasion of invasive species are obligations governed by the Habitat Directive and Invasive Species Regulation (EC, 2014), as well as the setting out of management measures. In Vienna in this regard one interview partner indicated that,

(09) " (E)very 10 years a management plan for landscape-protection areas is put in place and management measures in Natura 2000 sites are evaluated regularly by random sampling." (ÖV11)

Additionally, according to the Invasive Species Regulation (EC, 2014) paragraph 20, emergency measures need to be taken if invasive species threaten native species (EC, 2014). As the Habitat Directive and Bird Directive help to restore and improve the natural state of ecosystems, they should be retained and other policies, like those on farming or energy, should be adapted to climate change (Fries-Tersch et al., 2015). Therefore, social and economic needs need to be integrated into plans to decrease trade-offs, such as afforestation when dealing with mitigation, the resilience of ecosystems and biodiversity (De Bremond and Engle, 2014). Water management is another example. One respondent explained for Vienna:

(10) "We have a national water resources management plan, the implementation of the Water Framework Directive and plans like the renaturation of the Wienfluss, Mauerbach and Liesing have been realized […] and measures to improve their ecological status are reported regularly to EU." (SV5)

According to the European Commission, the good ecological status of rivers is necessary and synergies between the Water Framework Directive and the EU Biodiversity Strategy and Habitat Directive are also desirable (EC, 2015b).

The EU Biodiversity Strategy demands, for example, an ecosystem-based adaptation approach, as well as using technological solutions for conservation (Naumann et al., 2011). These solutions are important and frequently used to control invasive species:

(11) "Because of the impact of climate change on Vienna the control of alien species has increased." (SV5)

Apart from all these problems within Natura 2000, too few areas of protection have been designated, which led to proceedings against Austria (Geitzenauer et al., 2016). According to one interviewee, Vienna already reacted. Thus.

(12) "The subsequent nomination of one additional Natura 2000 site at Leopoldsberg [which] is taking place." (W2)

The proposed Natura 2000 site at Leopoldsberg has a size of 6 ha and is representable for the habitat type no. 9150 Medio-European limestone beech forest of Cephalanthero-Fagion (Nature Consult, 2013). The authority to handle nature-conservation issues of this new area and the other 4 Natura 2000 areas in Vienna is divided between departments as expressed by one interviewee:

(13) "MA22 [Municipal Department for Environmental Protection] is the provincial authority for EU nature conservation, but nature conservation measures are implemented by MA49 [Municipal Department for Forestry and Urban Agriculture]." (W2)

According to SV5, other municipal departments and scientists – depending on the issue – are also involved. However, these measures mentioned by municipals departments and scientists are only a selection of implementation in order to fulfil the obligations of EU nature-conservation and climate-protection policies. It must also be emphasized that during the interviews many other measures were mentioned, but it seems that only the minimum has been accomplished. As stated by a stakeholder below, the Natura 2000 site Lainzer Tiergarten has, for historical reasons, stricter protection:

(14) "The essence of our [Viennese] nature conservation law is, rather than under the Habitats Directive, that the Lainzer Tiergarten, as a Natura 2000 site, is more protected than it would be under EU law. According to the Habitats Directive you have to show that a planned project doesn't have any negative impact on the favourable status of conservation, but the balancing of interests [must take place]. Under Viennese nature conservation law [this balancing] isn't admitted at all. That is unique in Austria." (SV4)

Hence, even though a new Natura 2000 area is up-coming and stricter protection areas through provincial law exist, there is still a need for improvement.

4.3. Extent of achievement of nature conservation policy and the climate protection policy

According to Rannow (2011), conservation can be enhanced by scientific nature-reserve management, enforced by the additional enhancement of the nature-reserve administration and supported by participation to optimize the decision-making process and increase awareness. Responsibility for conservation does not lie with the state of Austria (Geitzenauer et al., 2016) and that is seen as the reason why some measures are not seen to be working as efficient as they could be (Rannow, 2011). This is supported by the perception of one of the stakeholder in the following way:

(15) "As the authority is divided between 9 federal states, I don't think that the designation of Natura 2000 sites was based on a master plan. At best within a federal state but not nationwide." (W6)

This seems to confirm past findings, as during a study by Acosta et al. (2013), who used the data from 1995 to 98, Austria had a high degree of power and flexibility, which led to awareness and ability, but little action, within the field of nature conservation. Generally, to ensure climate-change-adaptation policies are successful, it is important to concentrate on actions such as sustainable use, conservation of ecosystems and ecosystem services, while the temporal and spatial scale must be considered when implementing short-term and long-term measures capable of reacting to different issues on a national and regional level (De Bremond and Engle, 2014).

However, concerning the current state and evolution of Natura 2000 sites in Vienna another interview partner stated:

(16) "I know nothing about radical degradation or improvement to the current Natura 2000 sites, as the areas have been in a good condition for a long period of time." (NGO1)

Therefore, even if policy gaps do not match conservation needs and monitoring is insufficient (Van Teeffelen et al., 2015), no concrete transformation within Vienna has been indicated by the interviewees. For the conditions of Natura 2000 sites, some measures are not seen to be working as efficiently as they could, even although according to one interviewee:

(17) "Regular monitoring of Article 17 reports takes place […], but that is only a fraction of the monitoring activity that takes place in Vienna" (SV4)

But on the other hand there are more pragmatic views of this:

(18) "Specific biodiversity monitoring hardly takes place at all, as to fulfil the obligation of Natura 2000 only the most essential monitoring is carried out in order not to violate EU law in an obvious way" (W12)
(19) "To fulfil the EU directives the administration requires […] a minimum level of implementation. That is the reality." (ÖV11)

As it is shown in other countries, such as Australia, cooperation between actors is necessary to secure a sustainable policy in the light of climate change (Ergas, 2010), which might be the reason why the level of implementation in Vienna is not as high as it could be found in the following statement regarding the National Park Danube River:

(20) "Actually we have two national parks, a Viennese and a [Lower Austrian] one [for more explanation see e.g. National Park Danube River, 2017a,b]. The Viennese pursue their own targets and coordination is happening, but a too close a cooperation is not wanted." (W2)

Other reasons for this limited cooperation could be gained from the following perception of another interviewee:

(21) "We are trying to coordinate [with the Lower Austrian management], but you have to keep in mind the two different legal approaches." (SV4)

On the other hand, improvements were mentioned:

(22) "That [softwood riparian forest] has been a problem for many decades now. The status of the softwood riparian forest and xeric habitats was problematic, but through a LIFE project specific measures aimed at riparian-landscape species led to a gradual improvement." (NGO1)

The reason that there is little adaptation - or scientific implementation of measures - in Natura 2000 sites in general could be that forest managers find it hard to act on scientific recommendations. This might be because no specific short or midterm measures on a local level are put in place and it is more common to just react to certain events than to take long-term measures against theoretical threats (De Koning et al., 2014a). Furthermore, sometimes citizens prevent implementation from taking place such as indicated by the following statement:

(23) "On the xeric habitats and arid steppes of the Lobau, grazing projects […] are hard to implement because of vandalism." (W2)

The reason for such behaviour according to SM15 was that trails had not been accessible because of the grazing project, therefore:

(24) "The grazing area has been increased in the Obere Lobau, field areas have been added and accessible trails have been kept open." (SM15)

Other problems include that LIFE projects within different European countries, including Austria are not co-funded by innovative funding mechanisms, such as private funding, and they are not focused on opportunistic land stewardship (Račinska et al., 2015). While a review of climate-change impacts on conservation investment states that biodiversity loss is unavoidable (Hagerman and Satterfield, 2014).

The extents of achievements in climate protection policy and nature conservation policy have a direct connection. For example, the implementation of urban ecology measures as one of the climate-protection measures mostly mentioned by the interviewees is also listed in achievements of nature conservation above. This shows that natural side effects are available. However, a measure mentioned which focuses only on climate protection is:

(25) "The switch to district heating using the waste incineration plant and heat coupling […]. Through the expansion of climate-friendly district heating, 1 million tonnes of CO_2 have been saved [since KLIP I]." (ÖV9)

As already mentioned in the chapter 4.2, during the further fulfilment the obligations of EU nature conservation policies there is still need for improvement.

4.4. Difficulties that limit the achievements

The interviewees mention a number of problems which they consider to hinder the successful implementation of measures:

(26) "Implementation is limited […], as in reality other contrasting strategies with greater [financial] resources exist." (W12)

But even if measures are agreed on, they are not recognised as nature-conservation measures:

(27) "The [adaptation strategy and KLIP] measures are not part of the practice of nature conservation." (ÖV11)

However, there are related critical issues within climate policy. For example, greenhouse gas emissions are measured by production rather than consumption, leading to more emissions within developing countries, which could be corrected by "balance-of–payment feedback", a consumption-based approach, where developed countries pay for the emissions of imported goods (Steininger et al., 2014). The reasons for these issues often seem to be financial, personal or because of different priorities. Furthermore, alternative socio-economical compensatory approaches in Natura 2000 sites might lead in new directions, as connected to conservation, have the potential for improvement (Blicharska et al., 2016).

Furthermore, it would be necessary to enhance the connectivity of Natura 2000 sites with (private) protected areas through the implementation of the Biodiversity Strategy 2020 (Račinska et al., 2015). This green infrastructure acts as stepping stones and corridors to help the migration of some species (Jongmann et al., 2014). An additional statement regarding roof greening indicates a different situation:

(28) "At the moment [roof greening] only is part of one single development plan […] In the development plan extensive roof greening is only prescribed for 50–80% of the 5% inclined roof or on a flat roof […] 8–10 cm^2 is already considered to be extensive." (NGO7)

However, within Europe endangered species might prevent renewable energy sources such as wind and solar from coming on-

stream within their habitats, as conservation is the priority (De Bremond and Engle, 2014). Furthermore, it is important to ensure that there is an awareness of biodiversity loss and the importance of ecosystem services in order to promote restoration measures through a stronger involvement of the public in the process (Baker et al., 2014). This would be so even if it led to a discussion of different cultural, social, economic or ecological interests (Baker et al., 2014). In Vienna, also for building awareness and better understanding, sufficient financing is necessary as reflected by the following statement:

(29) "As nature conservation lacks financial resources, it is too much to ask to act in a forward-looking manner. But I have to admit, that it is necessary to do so. The models of, and research on, how habitats and species will develop show that invasive species will spread. Therefore, we know that we are in trouble." (W2)

The lack of financial support and the priorities of different resorts and of the public opinion were the two main reasons mentioned by the interviewees as to why implementation is not fully realised in Vienna.

4.5. Nature-conservation management as part of climate protection

In previous sections the awareness of the need to adapt to climate change has been shown to be moderate, with building awareness being seen as an important tool (see Veigl, 2015). Another statement gained during the interviews supports these findings:

(30) "With laws and regulations alone you can only reach the goal to a certain degree, awareness must be promoted as well." (SV04)

Apart from building awareness, practical solutions rather than political interests and ideologies should also be seen as important (De Koning et al., 2014a). With this in mind, the following answers to the question of whether nature conservation in Vienna has been seen as an important part of climate protection are interesting:

(31) "Awareness is not well-developed." (NG01)

or more specifically:

(32) "Presenting nature conservation as climate protection is a new phenomenon, but we conservationists don't use it. Rather we say that if we protect habitats, it is good for climate protection as well." (ÖV11)

In addition, one interviewee notes:

(33) "[Climate protection measures] and forest management are discussed within expert circles, as it is considered a complex topic, […] a poster campaign [to communicate with] the general public would overburden the citizens." (ÖV14)

The reasons for a possible overburdening are expressed by one interviewee in the following way:

(34) "Studies that deal with how nature-conservation actions affect the CO_2 balance are not in the forefront of politicians' and citizens' minds, […] especially as the connection with CO_2 reduction is not blatantly apparent." (NGO1)

This also went together with a certain amount of self-criticism by another respondent stating:

(35) "I believe it has been [promoted] too little. [Nature conservation actions and initiatives for climate protection] have been made insufficiently public globally." (W2)

Building urban climate-change resilience that consists of technical solutions and citizen participation is only possible with successful awareness building (Bahadur and Tanner, 2014). However, measures have been taken in order to build the awareness of the citizens of Vienna such as expressed in the following by two respondents:

(36) "Nature conservation measures as [tools of] climate protection are promoted by Bio Forschung Austria through various workshops." (ÖV9)

(37) "In the Biosphere park, core-protection-area measures with deadwood, which many people are sceptical about, are promoted as climate and biodiversity protection." (SM8)

According to interviewees (NG16, SV10, W 2/6/12, SM8, M13 and ÖV9) the awareness building measures are expandable. Typically, adaptation measures like maintaining ecological resilience by decreasing GHG emissions and increasing carbon storage, strategically planning and gaining knowledge are useful by themselves, but are usually less useful as effective measures in public discourse than biodiversity measures (Naumann et al., 2011). This is especially true as regions high in biodiversity are also high in carbon, which leads to economic versus conservation conflicts (Jantke et al., 2016). In order to achieve resilient ecosystems, it is important to know the current state of vegetation communities, populations of species and functional diversity (Heller and Hobbs, 2014). However, the importance of nature conservation and building awareness has spatial and functional limits within the city such as perceived by respondents in the following ways:

(38) "Nature conservation doesn't solve climate change problems […] A positive contribution would be more urban nature conservation programmes through the greening of buildings and similar architectural projects. The same is true of river-draining measures, where the changing hydrology is a result of climate change. […] I don't think that you have the possibility to prevent emissions by nature conservation measures." (W02)

(39) "If you separate them [nature-conservation and climate-change measures] functionally and spatially, then you have little potential for conflict in urban areas between urban-ecology-related issues, where climate conservation and climate-change adaptation play a certain role, and classic biodiversity protection, since there are strong synergies." (W12)

Even given the synergies, information sheets and guidelines to build and enhance awareness of and cooperation with stakeholders are provided for administrations and local governments (Federal Environment Agency 2014), climate change adaptation effects do not seem to be highlighted, despite in place. The following statement of one respondent also indicates this:

(40) "Nature conservation [under KLIP II] runs under "we do our best in the following areas" […] like waste management, agriculture and forest management. Despite it having only a small impact on climate protection, it's hardly quantifiable, only a few kilos [of CO_2]." (ÖV09)

Thus, the communication of nature conservation as climate protection is marginalized, even though building awareness of the general public and local stakeholders about its impact on soil as an environmental resource (EC, 2013b). Increased cooperation with agriculture, forestry and land use, is necessary for sustainable and rational land use (EC, 2013b). As most ecosystems in Europe have been shaped through centuries of land use, maintenance by private stakeholders brings advantages in the form of flexibility and local knowledge (Disselhoff, 2015). However, their work needs to be appreciated by the public, they need to receive special training and a combination of national and European funding should be provided rather than just legal frameworks (Disselhoff, 2015), in order to secure the maintenance of human-made habitats. One respondent acknowledges this for Vienna:

(41) "Yes, I would say, that [nature conservation initiatives on Natura 2000 sites for human-made habitats] have an impact on the climate." (SM15)

Thus, according to SM15 the ecological reassessment of meadows, for example, has been seen as relevant for climate change adaptation.

Finally and in general, across all the five larger results parts described, we do not see critical differences in approaches, attitudes and answers between NGOs, scientists, management and administration. That does not indicate that there are not any as the number and selection of interview partners might not be seen sufficient comprehensive and/or representative in this regard. For several of the stakeholder groups it even seems impossible to get any how a representative sample of interview partners working on both, climate and conservation (e.g. NGOs).

The assessment of the interviews followed through the qualitative content analysis an established method. The selection of the categories (see Appendix) as most significant substantives from the questions of the interviewee guidelines contains a sort of subjective element but this is unavoidable.

5. Conclusions

The conclusions are in the following structured in similar manner like the results in order to better see the corresponding connections, deductions and implications.

Firstly, very often the priorities of the EU-legal framework regulation are left behind and the importance of local and provincial actions is put first. The EU Commission, as a proactive authority, influences the national policy-making of EU member states (Damro et al., 2008) and certain measures have to be taken in order not to violate EU law. Only a minority saw an overlap between climate-protection policy and nature-conservation policy, e.g. M13 in same stakeholders involved and SV5 in aiming similar goals; however, both policies are being put into action in different areas. This implies the necessity to increase connections and complementarities among the two policies also for an improved transposition and implementation as well as calls for additional related research in particular about potential priority fields of action.

Secondly, the implementation of EU climate and nature-conservation policy is a "learning by doing" process, building awareness through transparency when documenting and discussing options, as well as evaluating methods and errors (Baron et al., 2009). In Vienna, however, the KLIP program and annual reports help to show the implementation of climate-protection measures within Vienna. Nature-conservation policy measures include monitoring, the Natura 2000 sites management plans (apart from the site Liesing), afforestation, and invasive-species control and subsequent elimination. Unfortunately, these measures often only cover the minimum of obligations, there is a low-level of coordination between policies and a master plan is not available. Through the limited cooperation between different departments and stakeholders, implementation is limited as well. This raises needs for additional action beyond the minimum approach and increased cooperations between actors. Future research could assess extent and (potential in-)sufficiency of the actions taken within the minimum approach, identify fields of immediate additional actions needed as well as the means and processes that likely lead to qualitatively and quantitatively improved cooperation outcomes.

Thirdly, regarding the management of Natura 2000 sites for climate-change adaptation in Vienna, awareness and communication of the issues are very limited. However, workshops and guided tours are available. Most interviewees doubted the influence of Natura 2000 sites on the urban climate, but the importance of green areas (green infrastructure, corridors etc.) has been pointed out to have the effect of buffering climate change. Increased awareness-raising about the positive impact of Natura 2000 sites for climate-adaptation in Vienna appears to be an important policy measure currently underdeveloped. Research could provide both, assessment results on the current status of this knowledge based on literature and tested case-studies for best practices in order to indicate how to increase this awareness in the most cost-effective manner.

Vienna is just at the beginning of a long-term process of adapting to climate change in consistence with nature conservation, but in order to do so, awareness within all stakeholder groups needs to increase and priorities need to be changed.

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Appendix. Categories used to extract the essential information out of the interviews giving by the participants of stakeholder groups

Stakeholder category	Scientists			Public administration			Natura reserve administration			Nature reserve management			NGO			Mediator
Interviewee number	2	6	12	9	11	14	4	5	10	3	8	15	1	7	16	
general conditions																
strategy	X	X	X		X	X	X	X					X		X	
support and financing	X				X	X		X		X	X	X	X	X		
research	X	X		X		X	X	X	X			X	X	X	X	X
climate change	X			X			X	X	X	X		X	X			
PR/building awareness																
measures and their extent	X	X	X	X	X	X	X		X	X	X	X			X	X
awareness	X	X		X		X					X	X	X	X	X	
legal obligations																
EU, national and regional law							X	X					X		X	
players																
duties and authorities	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
motivation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
cooperation	X	X		X	X	X	X	X	X		X	X		X		
process																
implementation process	X	X		X	X	X	X	X	X	X		X	X	X	X	X
implementation of nature conservation																
vulnerability of subjects of protection	X	X	X		X	X	X	X	X	X		X	X	X	X	
nature conservation measures	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
potential of improvement	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
implementation of climate protection																
measures		X		X	X	X		X	X		X	X		X	X	
potential of improvement	X	X	X	X						X	X	X	X	X	X	X
climate change adaptation																
potential of improvement	X	X	X			X				X	X			X	X	
problems																
nature conservation- conflicts of interests	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
climate protection	X	X	X	X		X					X			X	X	
nature conservation as climate protection	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X
interface: nature conservation as climate protection																
measures	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
urban climate	X	X	X	X						X			X		X	
climate change adaptation via managementplans		X	X					X	X	X	X	X	X	X	X	

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